RICE

SEARCH

- MST Program
  - Application
  - Courses
- ASTR502
- ASTR503
- ASTR530
- PHYS501
  - Requirements
  - Workshops
- Programs for Teachers
  - Needs Surveys
- Survey Results
  - Courses for Teachers
  - Online Courses
  - Mailing lists
- Rice Education Sites
  - Center for Education
  - K-12 Initiatives at Rice
  - Rice School Mathematics Project
  - School Science & Technology
  - Teacher Education at Rice
- Links
  - Rice Physics & Astronomy
  - Rice Space Institute
  - Space Science Outreach [space.rice.edu]
  - The Public Connection [earth.rice.edu]

Contact Information

Dr. Patricia Reiff | reiff@rice.edu
Rice Space Institute, MS-108
Rice University
6100 Main Street
Houston, TX 77005-1892

ASTR 530 : Teaching Astronomy Laboratory

DESCRIPTION | OVERVIEW | LEARNING GOALS | CLASS DETAILS | SCHEDULE | HOMEWORK | OBSERVING

Spring 2016

DESCRIPTION

Methods and facilities of observational astronomy for public education. Includes training in telescopes, astronomical binoculars, portable planetariums, telescopes, digital cameras, photography (still, 3D, and time lapse). Students will help train beginners in the use of telescopes and carry out a modest observational program. The course requires one public presentation and internship work. Topics may vary with each offering.

Prerequisite(s): Any of: ASTR 230, ASTR 350, ASTR 360, ASTR 402, 403, 502, or 503 or permission of instructor.

OVERVIEW

This course introduces teachers (inservice or preservice) to the fundamentals of astronomical hardware and software, including telescopes, binoculars, sky software, spectroscopy, digital cameras, movie-making, CCD imagery, planetariums, etc.

LEARNING GOALS

As a result of this class, the student will be able to:
1. set up, align and operate manual and computerized telescopes and astronomical binoculars.
2. (Communication) teach others how to use a telescope safely.
3. compute the magnification of a telescope from the focal length of the objective and the eyepiece, and perform other calculations relative to image size and brightness.
4. make an anaglyph 3D stereo image.
5. make a stop-action time lapse movie.
6. use filters for safe solar observations, and (Communication) to demonstrate safe techniques to others.
7. create an observational project that is suitable for the level of their own students (e.g. middle school, high school), and demonstrate to the class.
8. set up and operate a portable planetarium.
9. (Note - in future years, goals may vary including data analysis of actual astronomical data).

CLASS DETAILS

Instructor	Prof. Patricia Reiff (reiff@rice.edu), with special activities by Adjunct Prof. Carolyn Sumners of the Houston Museum of Natural Science.
Classroom	HBH 223, 6:00 - 9 pm MONDAYS starting January 11, plus observatory (BRK400), planetarium (BRK250) and lab sessions TBD Also used: Oncampus Observatory, HMNS Planetarium, George Observatory and HBH 254. One overnight at George Observatory if it can be arranged.
Text	"Space Update" DVD-Rom ($10) and other handouts.
Strongly recommended:	Personal laptop with "Quicktime 7 Pro" ($30 from Apple) and "Stellarium" (free planetarium software from stellarium.org). Also very helpful: headlamp with red/white LED light.
Grading:	Roughly 120 points possible. Two take-home exams each counting 30 points, plus around 60 points for homework. No comprehensive final exam.
	Any student with a disability requiring accommodations in this course is encouraged to contact me after class or during office hours. Additionally, students will also need to contact Disability

Students With Disabilities	Support Services in the Allen Center. Students will need to climb a few steps to use the 16 inch telescope but may use the smaller scopes without climbing.

SCHEDULE : SPRING 2016 (UPDATED FREQUENTLY):
For the most recent schedule go to the course web page)

DATE AND LOCATION	MATERIAL
January 11, HBH 223	Orientation and filling out of forms. Downloading and installing Stellarium and Space Update. Bring your laptop to class each week.
January 18	No Class - MLK day. All students wishing to enroll for credit must fill out forms by Jan 20.
January 19, BRK400, 6:00- 9:00 pm	(IF CLEAR) Observe the occultation of Aldebaran by the Moon. Learn basic telescope setup. (Makeup of MLK)
January 25, HBH 223	First full class - celestial coordinates. Visit the campus observatory if clear. Homework 1 due.
Feb 1, HBH 223	Kinds of telescopes: refractors, reflectors. Parts of a telescope. Calculations of image size and brightness based on focal lengths and objective size. Visit the campus observatory to practice setting up the telescopes.
February 6, BRK 400.	IF NOT OVERCAST: Early morning observing at campus observatory. NOTE: class members should arrive by 4:30 to help set up telescopes. See events calendar for details.
Feb 8, HBH 223	Digital Cameras: Bring your digital camera (preferably a SLR with manual settings). We will discuss techniques of astrophotography, f numbers, etc. We will demonstrate how to set up for the 3D image taking (homework 3) and the time lapse photography (homework 2).

HOMEWORK (Spring 2016 (tentative))

- **Homework 1**: Install "Stellarium" from http://www.stellarium.org.
  Which weeks (if any) are the best to observe Mercury this semester? (in the evening or morning skies?) Which weeks (if any) are the best to observe Venus this semester? (in the evening or morning skies?) State which of these are evening or morning objects: [Jupiter, Saturn, Uranus, Neptune]
  . Will any planet be at opposition this semester (in the south at midnight? If so, which object and when? Pick at least three deep sky objects (nebulas, galaxies etc) that will be near the zenith at 8 pm this semester that could be observed with the 16 inch telescope. (not too dim!). Put down the name and the Right Ascension and Declination of each

.

- **Homework 2**: (time lapse movie): Plan a sequence of images taken by the same camera in the same location, over a period of time. We will make a time lapse movie. This can be a tree budding, flowering, and then putting on leaves; or a sequence showing the shadow move during a day or over a season; or something astronomical. Be sure to allow for growth of the tree or plant when setting up your camera. Mark carefully your camera location to ensure image registration.
- **Homework 3**: (stereo imaging): Take two photos, moving the camera by two or three inches to the right for the second shot (but keeping the direction of aim the same). We will create red/green anaglyphs for stereo viewing with red/green glasses.
- **Homework 4**: Calculations of image brightness and magnification for telescopes, cameras and binoculars
- **Homework 5**: (Educational Project): Create an observing project that you might use with your students and demonstrate it to our class.
- **Homework 6**: (Public Education Project): Participate in at least two public events, e.g. operating a telescope at one or more public open house nights at the campus observatory, operating a solar scope at "Sun Earth Day" at the Museum, and/or NSTA national in Boston. Write up what you did.
- **Homework 7**: (Observing Project): Observe six or more celestial objects, at least 3 solar system and 3 deep space. and make careful drawings using the observer sheets. Learn how to estimate limiting magnitude and the size of the field of view of the eyepiece. Demonstrate ability to setup and align a C8 telescope. Demonstrate ability to find and center on objects in the 16 inch telescope.
- **Homework 8**: (CCD imaging): We will take CCD images with the observatory scope, plus a white "flat" to correct for the pixels. We will either take three images in sequence to look for asteroids or we will take red/blue filter images look for colors in clusters.

OBSERVING PROJECT (Spring 2016 (tentative))

Observe at least 6 solar system or deep sky objects. Draw a sketch using the **JPG** or **PDF** observing form, being sure to note location, telescope used, etc. Try to determine by using star charts what the "limiting magnitude" is at the time of the observation (the dimmest star you can see). Make the circle on the page equal the FIELD OF VIEW of the telescope/eyepiece combination. (For visual observations note the angular size of the FOV of your sketch).

If Jupiter or Saturn is visible, use its size in your field of view to estimate the field of view of the eyepiece by seeing how many Jupiters (or Saturns) fit across the field of view.

Find out how far away Jupiter was the day you observed. Use its physical size and its distance to get its angular diameter; from that you should be able to calculate the field of view. (You can check against the chart on the wall for the FOV of the various eyepieces on the 16 inch)

We will make at least one astronomical CCD and/or spectroscope image. We will look for colors of clusters, motion of asteroids, etc.

There will be at least four evening sessions, including all Rice "Observatory Open Houses", including one in the MORNING Feb 6! We will schedule one field trip to the "George Observatory" (in Brazos Bend State Park); or you can go any clear Saturday evening. We will try for one overnight at the observatory (date TBD)

Rice Space Institute 6100 Main MS-108, Houston, Texas 77005-1827 Mailing Address: P.O. Box 1892, Houston, Texas 77251-1892

©2010 Rice University Rice Home Web Services University Calendar Rice A-Z Maps-Directions Feedback